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ABSTRACT

This paper discusses research on bilingualism, describing how language development proceeds under exceptional circumstances (for example, when processing must be shifted to another modality, and in abnormal development of one kind or another). It examines exceptional bilingualism, focusing on research on deafness (e.g., hearing children of deaf parents, the polyglot savant Christopher, and sign language genesis among previously isolated deaf children in Nicaragua). Next, it discusses early differentiation in childhood bilingualism, highlighting evidence accumulating against the hypothesis that a single unitary language system extends for a prolonged period of time prior to the separation of languages. The third section discusses codeswitching and linguistic borrowing, noting that findings point to an early convergence with adult codeswitching norms during the preschool years. The fourth section critiques a "wholistic" model. The paper proposes a model of modular bilingual competence based on an extension of Jackendoff's (1998) Tripartite Parallel Architecture (TPA). Following the TPA model, the bilingual version is intended to make for a close match with a model of bilingual proficiency--how the linguistic components and their interfaces are deployed in actual language use and how the processing of L1 and L2 fits into a broader mental organization that accounts for meaningful comprehension and expression. (Contains 53 references.) (SM)

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Cross-linguistic Influence, Transfer and Other Kinds of Language Interaction: Evidence for Modularity from the Study of Bilingualism

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Over the past several years we have been examining a series of apparent tendencies and descriptive generalizations from our work with bilingual school-age children in Mexico that evoke concepts discussed in research in other bilingual contexts. The idea that runs through this research that seems to hold a key to understanding a whole range of observations is that bilingual proficiency is internally differentiated in a number of interesting ways. Observations from our own descriptions of children's performance on school-related tasks prompted a study of other bilingual research projects focused specifically on: language separation, cross-linguistic interactions as in borrowing and codeswitching, the relationship between grammatical competence and literacy-related discourse abilities, and how lexical knowledge in two languages is related to other domains of linguistic knowledge in bilingual children. These aspects of bilingual proficiency have come to the foreground in our own attempts at describing children's development in Spanish and one or another indigenous language spoken in Mexico.

When complex systems suffer breakdowns, lose equilibrium and get out of balance, what before appeared to function as a completely integrated unit opens up to provide us with a vantage point onto components that once passed unnoticed. Compared to monolingual competence and performance, bilingualism affords more opportunities for examining the components of language because aside from simply being a more complex system, during development and use it seems to be more susceptible to different kinds of imbalance and tension. The method of examining disassociations of different kinds, especially "double disassociations," has been an important tool exploited by language researchers; bilingualism multiplies the possibilities. One starting point, among others, is to begin to describe how language development proceeds under exceptional circumstances: for example when processing must be shifted to another modality, and in abnormal development of one kind or another.

1. Exceptional bilingualism

Recent studies of sign language acquisition have provided the field of bilingualism with fresh perspectives on old questions. For example, in Quebec, Petitto (1997) was able to study the different combinations of bilingual-bimodal signers (e.g. hearing children born to deaf parents), bilingual-unimodal signers (ASL/LSQ, American Sign Language/Langue des Signes Québécoise), and two types of monolinguals (deaf ASL or LSQ signers and hearing signers not exposed to speech).

Confirming previous findings that sign and speech pass through the same developmental milestones, she went on to take a closer look at the earliest stages in bilingual and bimodal subjects. Comparing ASL and LSQ in bilingual babblers, initial stages show no differentiation; by 12 months however, language specific sign-phonetic units begin to emerge. Bimodal (e.g. ASL and English) infants produced both manual and vocal babbling within the same developmental time period. Petitto (1997: 59) proposes: "The infant's nascent sensitivity to aspects of language structure may reflect the presence of a neural substrate that is uniquely sensitive to the stimulus values specified in prosodic and syllabic structure." "A mechanism ready to differentially process input signals," dedicated uniquely to linguistic input, accounts for both early differentiation in ASL/LSQ bilinguals and for the finding that bimodal infants treat both speech and sign as language.

This mechanism is both "rigid" and "flexible." Rigidity is the hallmark of underlying linguistic templates sensitive to distributional patterns specific to natural language - "abstract features of language patterning"; flexibility is evident in how the "capacity for language can be potentiated in

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multiple ways" depending on available input-output resources and environmental pressures (Petitto, 1997: 56-58). Domain-specificity then refers to how structure-seeking modules analyze linguistic input at an abstract level beyond and independent of modality. That language cannot be derived solely from general cognitive capacities is demonstrated in deaf children's consistent separation of linguistic signs and gestural communication, even though both share properties of formation and reference (Petitto, 1992: 28-31). For example, despite the high iconicity of many ASL signs it appears that the time-course of language acquisition in normal sign language development (i.e. during the same critical period that corresponds to all other kinds of early child language development) is not affected. There seems to be an important differentiation between early prelinguistic gestures and early linguistic forms, lending support to the idea of a modular-type differentiation between general cognitive domains and a separate set of interacting special-purpose linguistic components (Lillo-Martin, 1999).

Probably, the most compelling recent evidence for the robustness of children's language structure-seeking capacity comes from the ground breaking investigation of sign language genesis among previously isolated deaf children in Nicaragua. Since the early 1990s child language development specialists have been able to get an unprecedented glimpse into the creation of sign language creole arising from an exceptional multilingual engagement of pidgins, home-sign systems, and spoken language.

Differing from the typical creolization context, the new sign language, Idioma de Signos Nicaragüense (ISN) was formed apparently without access to a full-blown language substrate. In the study, a series of cohorts of previously linguistically isolated children were evaluated to determine the level of proficiency attained despite the absence of a fully formed language model. Upon contact with other deaf children, in this case none of whom at first had advanced beyond a stage of a primitive homesign gestural system, students in the newly established schools for the deaf became the agents of the creation of two new linguistic systems: 1) a peer-group pidgin, highly variable, that evolved into a communication form progressively incorporating shared signs and an incipient grammatical structure; and 2) a distinct, fully-formed sign language, ISN (Kegl et al., 1999: 180). Crucially, each stage of language development represented a qualitative leap forward over the previous stage confirming the observation from previous work of how children surpass impoverished models. Most interesting, however, was the finding that ISN, the signed creole, emerged precipitously when the peer-group pidgin became the input to very young children. ISN, thereupon, became the target language for all other sign language learners in the community. Morford and Kegl (2000) discuss the question of a continuity between gestural communication and linguistic development. Exposure to conventional gestures used by hearing family members in the case of the isolated homesigner results in defective linguistic development, surpassing the impoverished model, but minimally. A community of homesigners, on the other hand, gives rise to a system that is sufficiently rich to support the emergence of a full-fledged creole if sufficient exposure is available during the critical period.

Commenting on the findings, Senghas and Coppola (2001) refer to earlier research (see Goldin-Meadow, 2000) that had already demonstrated the capacity of deaf children to build grammatical structure from significantly degraded input (degraded far below any level associated with the notion of "poverty of stimulus" that is a condition of all childhood language acquisition). In the case of ISN genesis, they speculate that:

> ...the time required to originate a language many exceed a child's sensitive period, which presumably evolved to enable learning from a full language model. Without rich input, an individual may still have the resources, but not enough time... If time is the limiting factor, perhaps sequential cohorts of interacting individuals, successively building on the achievements of their predecessors, could effectively concatenate their individual sensitive periods into a combined period long enough to create a language (Senghas & Coppola, 2001: 323)

In effect, age of contact with the peer-group pidgin turned out to be the critical variable: homesigners immersed before age 7 were the most successful in surpassing their models, "slightly older" learners (8-14 years) made considerable progress, but consistently attaining levels less native-like in comparison to the youngest acquirers. Late immersion deaf students, past the critical period for language development, showed permanent effects of language deprivation. These late learners, whose

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first contact was initiated after 15 years, "do not acquire a signed language at native levels of fluency at all" (Kegl et al., 1999: 212). Particularly in regard to the non-native, second language learner type performance of the late childhood cohort (8-14 years), the Nicaraguan study represents a striking confirmation of Newport's (1990) earlier findings (that differentiated similarly among the categories native, early, and late ASL learners). In particular, see Herschensohn's (2000) discussion of modularity and the critical period in sign language and creole acquisition. The evidence for strong critical period effects in exceptional (e.g. delayed) first language learning (Curtiss, 1994), and double disassociations contrasting both deficient intellectual development/normal grammar and normal intellectual development/deficient grammar (Yamada, 1990; Rondal, 1995) all argue against an undifferentiated and holistic mental organization. If access to a Language Acquisition Device (LAD) is time and maturation sensitive, as the contrast between native and late (> 7 years) signers shows, whatever the acquisition device turns out to consist of, it will likely be special-purpose and domain specific to some important degree. Eubank and Gregg (1999) and Gregg (1996) take up the connection between critical period effects and modularity; for a related discussion on second language learning, see Foster-Cohen (1996).

Rounding out our review of research on exceptional bilingualism, the case study conducted by Smith and Tsimpi (1995) of the polyglot savant Christopher stands as one of the most extensive and theoretically well-grounded analyses of the components of language and language use. To review, we have considered so far two dimensions of modularity: 1) the separation between the respective representations of L_a and L_b and how this is manifested in development and language use (L_a <--> L_b), and 2) The relative autonomy of central cognitive systems, that correspond to general cognition and conceptual structures (CS), from the linguistic components of phonology and morphology-syntax (CS <--> L_{a+b}). Smith and Tsimpli's case study sharpens our focus on the second dimension.

The disassociation under scrutiny in Christopher's case confronts his normal, native-speaker level knowledge of English, a "hyperability" in his mastery of 16 second languages (in a number of which he attained intermediate to advanced proficiency), and a defective development in higher-order functions of language use that reflect significantly diminished capacities in a number of Central System domains. Analysis of Christopher's performance on a wide range of language tasks suggested to the authors a reconsideration and elaboration of Fodor's (1990) modularity framework.

Beginning with discontinuities beyond the normal range in first language (English) tasks: despite full command of the first language (L1)[1] grammar and superior vocabulary knowledge, Christopher experienced difficulty with interpreting sentences that involve resolving an apparent contradiction, increased processing demands, discourse level comprehension, and Theory of Mind (ToM) type problems (requiring second-degree interpretations of someone else's thought, e.g. imputing false belief) (Smith & Tsimpli, 1995: 61-77). While certain key discourse level and cognitively demanding pragmatic abilities are clearly sub-normal, conversational skills seem to find support in the interactive and contextual scaffolding of turn taking (p. 171). Smith and Tsimpli conclude that these deficiencies "arise from processing difficulties which involve the interaction of his modular linguistic faculty with central system operations" (p.79). From the pattern of assessment results, and evidence from the study of other abnormal conditions, e.g. autism, the case is made for a quasi-modular status for the Central System ToM representations; that at least some components of the Central System reveal modular-like characteristics (Tsimpli & Smith, 1998). While in Christopher's circumstance this suggestion would be more convincing if he hadn't also failed, in addition to some ToM tasks,[2] other language tests that implicate the participation of Central System-type operations, the stark discrepancy between his defective ToM abilities and superior vocabulary knowledge (Peabody Picture Vocabulary Test English: 121/100, German: 114/100, French: 110/100) (p.8) indicates that the Central System may not be entirely interactive and integrated. Superior, above average vocabulary knowledge in L1, plus all the possible non-redundant entries in the polyglot's sixteen L2s implies Conceptual Structure components for each lexical item that meaning can be assigned to, is unquestionably associated with development in higher-order Central System domains. Smith and Tsimpli argue for a model that views the Central System as "richly structured" but not "massively modular"; some components may be domain specific but not informationally encapsulated; for further discussion: Samuels (2000) and Gerrans (2002). Theory of Mind, for example (as evidenced in Christopher's uneven performance) depends on operations that are inferential and cognitively

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penetrable, taking advantage of a free flow of information among the different Central System components.

Assessments of Christopher's L2 proficiency confirmed this general view: on the one hand, a remarkable ability to learn L2 vocabulary (much less so in regard to syntax, as well as the pervasive transfer of syntactical patterns from English - commonly observed imbalances among all L2 learners). On the other hand, a seriously flawed performance on translation tasks coincided with difficulties in discourse processing and interpretative tasks in English. Christopher's translations, often incoherent, were far out of line from his general conversational proficiency in the respective L2s, radically underestimating his linguistic knowledge in each of his second languages.

2. Early differentiation in childhood bilingualism

The research that we have considered on exceptional bilingualism and exceptional (abnormal) L1 learning has shed some light primarily on the CS <--> L_{a+b} dimension of modularity. Turning to the studies of early childhood bilingualism will recapitulate some of the terrain covered by Petitto on L_a <--> L_b separation. A wide ranging discussion has ensued from decades of work dating back to the beginnings of scientific studies of child bilingualism. Recent installments in the debate perhaps give the appearance of a glimmer of consensus, in some quarters, between two potentially converging perspectives: an early L_a <--> L_b differentiation, and a very early differentiation.

Specifically, evidence has been accumulating against the hypothesis that a single unitary language system - a kind of fusion or hybrid of L_a and L_b - extends for a prolonged period prior to the separation of the languages (Meisel, 2001; Genesee, 2001; Bhatia & Ritchie, 1999; Nicoladis & Genesee, 1997; De Houwer, 1995):

1) As soon as bilinguals[3] begin to have access to grammatical knowledge at the multi-word stage approximately around the age of 2, when language specific word-order properties and inflectional morphemes emerge, they show a strong tendency to separate their languages grammatically. Whether a pre-grammatical stage or period of rudimentary syntactical development precedes the multiword milestone (implying a version of the unitary system hypothesis that should be compatible with early separation theories- Deuchar & Quay, 2000), will elude consensus for some time to come, for obvious methodological limitations. In any case, evidence against differentiation at the one and two-word stages, prior to age 2, would have no bearing on the question of language separation subsequent to the emergence of functional categories. If syntax develops along a maturational timetable, an early undifferentiated stage would be taken as a given.

2) In early bilingual development (2L1) each language has been shown to mark the same norms across time in comparison to monolingual stages - i.e. in balanced bilingualism, studies have found no evidence for either delay or significant facilitative effect for either language. Two L1 acquisition has been shown to be unconscious and effortless to the same degree as monolingual development. Within the critical period, the "settings" for each of L_a and L_b appear to be secured with the same level of automaticity, and based on the same amount of input (logically, even less for one or the other, or both), that is sufficient for the monolingual child.

3) Transfer of grammatical features, where it has been attested, is systematic. For example, Cross Linguistic Influence will tend to affect the weaker language more extensively. Unlike lexical development, phonology and morphosyntax in either L_a or L_b, or both, is complete (or age-appropriate for the relevant maturational stage) as opposed to "shared." Transfer of structural patterns from one language to the other in the case of balanced bilingualism tends to be temporary; in the case of non-balanced bilingualism, again, transfer, even if it were permanent and prolific in the same proportion as the imbalance between L_a and L_b, would not count as disconfirming evidence in regard to separate representations of each language. Persistent error patterns in the non-dominant, developmentally "incomplete," language have Cross Linguistic Influence as only one of a complex array of interacting underlying causal factors.

At first glance, we should be surprised that there is any sort of differentiation between L_a and L_b during the childhood years. Why, as Meisel (2001) points out, is the LAD selective about which kinds of variation are treated as one linguistic system and which are treated as two systems? It seems that a non-modular bilingual mind and non-modular bilingual processor would have to labor under the

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adverse conditions of an extended period of idiosyncratic transfer, fusion (and confusion), and all manner of delayed learning and disruptive interference. In fact, as we will see shortly, non-modular theories of bilingualism may tend to view these afflictions as serious potential problems (although there is nothing in the holistic view that logically should compel them to), even for normally developing bilinguals.

3. Codeswitching and borrowing

The two dimensions of modularity appear to reveal themselves in children's performance when we focus our analysis on borrowing and codeswitching. This ubiquitous bilingual performance feature could be taken as a type of transfer, or Cross Linguistic Influence, discussed in the previous section. As such (although here not indicating grammatical error or non-balanced bilingualism), we are presented with another example of how transfer is systematic and constrained by grammatical principles - as is the broadly accepted view today. On the one hand, in our study of Spanish/Náhuatl bilingual school-age children we found evidence for the ability to keep the languages themselves separate in specific domains of use. In regard to our second dimension, certain aspects of ability related to borrowing and switching manifest themselves in a completely uniform way, across the board (no differences related to age, grade level attained, or sex, and no correlation with any measure or category of discourse style or academically-related aspects of discourse), while other kinds of borrowing and switching ability vary in a systematic way among the same bilingual speakers (Francis, 1997; Francis & Navarrete Gómez, 2000).

Evidence for the first dimension (the L_a <--> L_b differentiation) comes from children's narratives, elicited in structured story telling situations, both oral and written, in both languages (Francis, 2000). As we have reported previously, when the task required a Spanish language narrative no mixing was in evidence. Starkly contrasting, in both oral and written Náhuatl narrative, mixing is prolific among virtually all children. This pattern coincides closely with an observed diglossic separation in conversation according to interlocutor and context for children beyond preschool-kindergarten age, correlating systematically with self-reports of language use patterns - e.g. in which language does one speak to teachers, family and friends (Francis, 1998). Predictable as these results turn out to be, they do however point to the need for researchers to explain how children are able to gate out the non-selected language in both spontaneous conversation and structured narrative tasks.

Proceeding now to the CS <--> L_{a+b} differentiation (between the Central System domain, that includes Conceptual Structure, and the linguistic modules), we can examine the difference between the aspects of switching ability that show themselves to be completely uniform and those that seem to show some kind of systematic variation. Our initial analysis of the child Náhuatl narratives centered on the identification of sentences containing Spanish switches or borrowings that might occasion a degree of grammatical incompatibility. Virtually none emerged from this assessment, a parallel evaluation of adult narratives showing the same general tendency. Given that mixing was largely restricted to insertions of single content words and discourse connectors, consistent grammatical compatibility was to be expected from a population of bilinguals with relatively high levels of competence in both languages, such as was the case. Still the phenomenon needs to be accounted for: how are bilinguals able to effect the relevant couplings in such a manner as to maintain integral grammatical structures containing two different linguistic systems? Even if it were a matter of avoiding more complex patterns from Spanish for insertion into Náhuatl sentence structures (i.e. a preference for "safe" insertions of single content words and connectors), what kind of grammatical knowledge accounts for this kind of "avoidance." In any case, this ability is universally demonstrated showing no variation as a function of any of the non-linguistic factors mentioned above. Adult narratives showed the same uniformity - e.g. literate adult bilinguals showed no superiority in their ability to maintain congruent grammatical structures combining constituents from both languages (Francis & Navarrete Gómez, 2000).

In contrast, patterns of frequency of content word (not connector) insertion do vary systematically across grade level among children in both their written and oral expression - older children switching to Spanish less frequently. This interesting result coincided with the finding on a separate series of evaluations in which, in response to sets of illustrations of everyday life, older

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children consistently provided a higher percentage of Náhuatl descriptive terms than younger children, i.e. 4th graders (over 2nd graders) begin to avoid, to a greater degree, Spanish terms when the task required providing Náhuatl vocabulary items, 6th graders, in turn, improved their performance over 4th graders. And generally, "Spanish borrowing avoidance" correlated positively with scores on a separate test of metalinguistic awareness involving the identification of words as Spanish or Náhuatl (Francis, 1999). Adults showed a wide variation in switching frequency in their Náhuatl stories, ranging from purist styles of zero Spanish insertion to frequencies higher than any child narrator. In the case of the adult narratives, as might be expected, correlations with other indices did not show the same sharp tendencies as was the case with the 2nd, 4th and 6th graders. However, in contrast to their ability to grammatically integrate Spanish insertion (to recap: equivalent and uniform to the same degree as children), frequency of Spanish insertion did correlate with 6th grade completion (Francis & Navarrete Gómez, in press). Even though the relation was confounded by the result that women, who in the sample generally had not completed 6th grade, also switched more frequently to Spanish, the disassociation still holds up, and needs to be accounted for. The following examples are illustrative of the mixing patterns that characterize the narrative elicitation tasks - predominately insertion of content words and discourse connectors into Náhuatl sentence structures.

Adult oral narrative:
In zoatintli mopepetla ica in *peine, mientras* in occe zoatzintli paca ni cone ica *jabón* huan *agua* niuhqui in occe zoatintli quitzquitoc ni piltzintli.
[The woman is combing herself with a *comb, while* the other woman washes her child with *soap* and *water* also the other woman is holding her baby.] (S14)
Te *maman* caltia ni *almat*zintzin *luego* tetlapatilia.
[Their *mother* bathes her *children (literally: soul-Spanish + endearment diminutive + plural - Náhuatl) then* changes them.] (C26)

Child oral narrative:
Huan ye huitze ome tlatlacame *entonces* umpa yeca yoyaque ce *día de campo* huan umpa quimtlamacaque *luego* in zoatzintli quimtlamaca huan mizton *igual* nequi tlacuaz. (AL606)
[And two men are already coming *then* there they went on a *picnic* and there they were given something to eat *then* the lady gave them something to eat and the cat *also* wants to eat.]
Occe ye tlapatilia ipiltzintli *porque* yazque in *fandango*, in occe ye mopepetla. (MR404)
[The other one is changing her child *because* they are going to a *party*, the other one is combing (herself).]

In Myers-Scotton's (2002) model congruence is established through the emergence or selection of a Matrix Language (ML) Frame into which Embedded Language (EL) constituents are inserted, the former dominating the formation of sentence patterns. EL counterparts are checked for integration into the grammatical frame of the language, the ML, that is "sufficiently activated to direct morphosyntactic procedures" (p.21). Muysken (2000), in addition to *insertion*, proposes two other ways L_a and L_b are observed to form integrated grammatical patterns: *alternation* (a shift, "code-switch," from the L_a system to the L_b system), and *congruent lexicalization* (in the sentence containing L_a and L_b, the languages share a common grammatical structure). See McSwan (1999) for a survey and discussion of the relative merits of prominent alternative theories. Nevertheless, despite a wide divergence of approaches, researchers appear to converge on the necessity to explain the same phenomenon: how knowledge of two language systems, and some kind of Cross Linguistic Interface underlie coherent bilingual speech. A consensus should come together around a language production model in which the conceptualizer activates both L_a and L_b lexicons and L_a and L_b grammatical systems in such a way as to effect fluent intra-sentential processing comparable in speed and structural well-formedness to typical monolingual speech. For an instructive contrast, see the discussion in Fabbro et al. (2000) on pathologic switching, here as a consequence of dysfunction of neurological mechanisms that are responsible for selection and regulation of L_a and L_b.

One avenue to pursue in exploring the CS <--> L_{a+b} distinction could take up the question of degrees of awareness, or accessibility to awareness, of the different switching abilities. As a proposal

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for further research we might offer the following: 1) the mechanisms responsible for maintaining grammatical compatibility in structures that contain insertions from an embedded language are normally inaccessible to awareness; attention to morphological and syntactic integration cannot normally be brought to bear on performance in either speaking or listening. That narrators maintain Náhuatl as the Matrix Language throughout (with few exceptions) is perhaps related to frequency of insertion, but the grammatical processing itself (that would "inhibit" crossing over to Spanish grammatical patterns) cannot be subject to conscious control and reflection. On the other hand, potentially salient features such as frequency, marked word choices for borrowed items, etc. would be noticeable, accessible to awareness, and subject to monitoring and control. The sharp diglossic separation in regard to language choice in written expression as was shown to be operative among all students at all grade levels of the Spanish/Náhuatl study (although here evidencing a uniform pattern) is probably, at one level or another, accessible to monitoring. Correlations between frequency, for example, and measures of metalinguistic awareness involving conscious attention to structural features of each language, suggest the participation of CS-type knowledge, that again would play little if any role at the point of language mixing, on-line. Speakers and listeners can direct reflective type monitoring only to the end product, not the intervening morphosyntactic processes. In a discussion of the development of metalinguistic reflection, Fodor (1998: 139) makes a related observation: "What children theorize about is not what's represented *in* their modules, but rather what's represented in the *outputs* that their modules compute...What the child has increasing access to is information in the structural descriptions that the modules deliver, not intramodular information per se." Jackendoff (1997) makes a similar argument.

A number of researchers of bilingual speech of young children have concluded that language separation is a prerequisite for intrasentential codeswitching: "one can only switch from one system into the other if the two are distinct" (Meisel, 1994: 414), a view that seems implicit in at least the *insertion* and *alternation* schemes of Myers-Scotton and Muysken. Based on his studies of young bilinguals, Meisel proposes that constraints on codeswitching should be examined as aspects of processing; the performance mechanisms that select, activate and inhibit, couple constituents from each language, etc., *reflect* underlying linguistic knowledge. As such, especially in the case of early childhood developing grammars (considering, in addition, that one cannot assume a completely balanced growth of each language system in the bilingual child), we can safely exclude the possibility that these processing constraints operate in a categorical manner. Nevertheless, findings point to an early convergence with adult codeswitching norms during the preschool years between 2 and 5 years. Access to the functional categories of the grammar appear to mark the beginnings of the qualitative turning point (Köppe & Meisel, 1995; Meisel, 1994; Genesee, 2002).

4. Critique of a "wholistic" model

That some aspects of borrowing and switching might vary across grade level and be subject to monitoring, while others appear to be uniform and inaccessible to awareness, prompted us to review results from the wide range of language assessments given to children in different bilingual indigenous communities (Paciotto, 2000; Francis, 1997; Francis & Paciotto, in press). Certain aspects of lexical development showed themselves open to learning and systematic variation, as was the case in proficiency in oral narrative performance, not to mention specific literacy-related language abilities. Context-dependent dialogic tasks and core vocabulary in the unmarked language of school (Spanish) showed no variation from 2nd grade on.

Reflecting upon the relative autonomy of the latter universally attainable and highly modular competencies brings to mind a number of controversies in the field that continue to generate considerable confusion. A recent theoretical proposal by Herdina and Jessner (2002) appears to systematically eschew modular conceptions, arriving at a number of conclusions which logically flow from their "wholistic multicompetence" perspective. Failure to fully take into account the componential nature of language proficiency explains the seemingly contradictory review of the literature and serious misrepresentations of current theoretical models including Universal Grammar and Cummins' construct of Cognitive Academic Language Proficiency. On the one hand the authors make reference to purported research findings that lend support to the contention that bilingualism

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contributes to linguistic and cognitive insufficiencies of one kind of another (pp. 7-11, 106-107), and the possibility in normal bilingual development of less than full mastery of both L_a and L_b: "[If] the effort required to master a language is split between two it is likely to result in a reduction of the mastery of both" (p.13).[4] On the other hand, adherence to the wholistic model, with its tendency to view the interaction between linguistic competence and general cognition as broadly open and unconstrained, makes it difficult to reflect critically on the more exaggerated claims regarding bilinguals' superiority in metalinguistic awareness, cognitive "flexibly", "creativity, " divergent thought" and the like (p. 64).

5. Conclusion

In an attempt to draw together some common threads from the previous sections on exceptional bilingualism, language separation, and cross-linguistic interactions (in the form of codeswitching and borrowing) we will conclude our discussion with a proposal for a model of modular bilingual competence, based on an extension of Jackendoff's (1998) Tripartite Parallel Architecture (TPA). Following the TPA model, the bilingual version is intended to make for a close match with a model of bilingual proficiency - how the linguistic components and their interfaces are deployed in actual language use and how the processing of L_a and L_b fits into a broader mental organization that accounts for meaningful comprehension and expression.

Jackendoff's model incorporates a conception of modularity that allows for an important role for interfaces that align and match up the correspondences in each modular component that are accessible to these inter-modular interfaces: communicating phonological structures (PS), syntactic structures (SS) and conceptual structures (CS), each autonomous from the others, but richly interconnected. In comprehension, for example, such a modular organization accounts for both bottom-up processing and top-down effects, the latter operating in a highly constrained manner. Phonological, syntactic and conceptual structures can maintain their strongly independent combinatorial systems and their specific formation rules thanks to the fast and modular-type operation of the interface connections.

The lexicon forms an integral part of the interfaces that keep the components of grammar and conceptual structure in registration with each other. Lexical items, because they include features that correspond to PS, SS and CS, function as interface rules (Jackendoff, 2002: 131) - establishing the proper correspondences among the components and subcomponents, linguistic and conceptual. The lexicon connects up the PS and SS components (the "linguistic side") with CS - the "locus for understanding of linguistic utterances in context, incorporating pragmatic considerations, and world knowledge." (p. 123). This analysis seems to be compatible with Smith and Tsimpli's (1995) division into "UG lexicon" and "Conceptual lexicon." "Language," thus, has one foot in the Central System and the other in the strictly linguistic domains.

The bilingual version (figure 1) portrays the separation between L_a and L_b by representing each grammatical system in parallel with separate domains for L_a lexicon and L_b lexicon, each integrated into the interface components of their respective language, linked, in turn, closely to the formation rules of their respective PS and SS. However, since lexical knowledge straddles language (here PS+SS) and thought (CS) the conceptual component of the lexicon is shared in common between L_a and L_b; for example, translation equivalents would be connected to a common set (by in large) of semantic features in CS. Since the lexicon is not just a simple listing of words in long term memory in which, for example, entries are "tagged" as belonging to one or the other language, the set of linguistic components (PS+SS) of each lexical system maintains its autonomy one from the other.

Interaction between the two systems is also constrained, responsive to the grammatical structures of each language. The Cross Linguistic Interface (CLI) is prolific and highly interconnective, sensitive to the full range of possible typological differences that may present themselves (e.g. function just as systematically and efficiently in Spanish-Italian bilinguals as in the circumstance of the English-speaking L2 learner of Mohawk), and also be capable of suppressing transfer and cross-linguistic influence of all kinds. If the phonology, morphology and phrasal syntax systems of each language are represented

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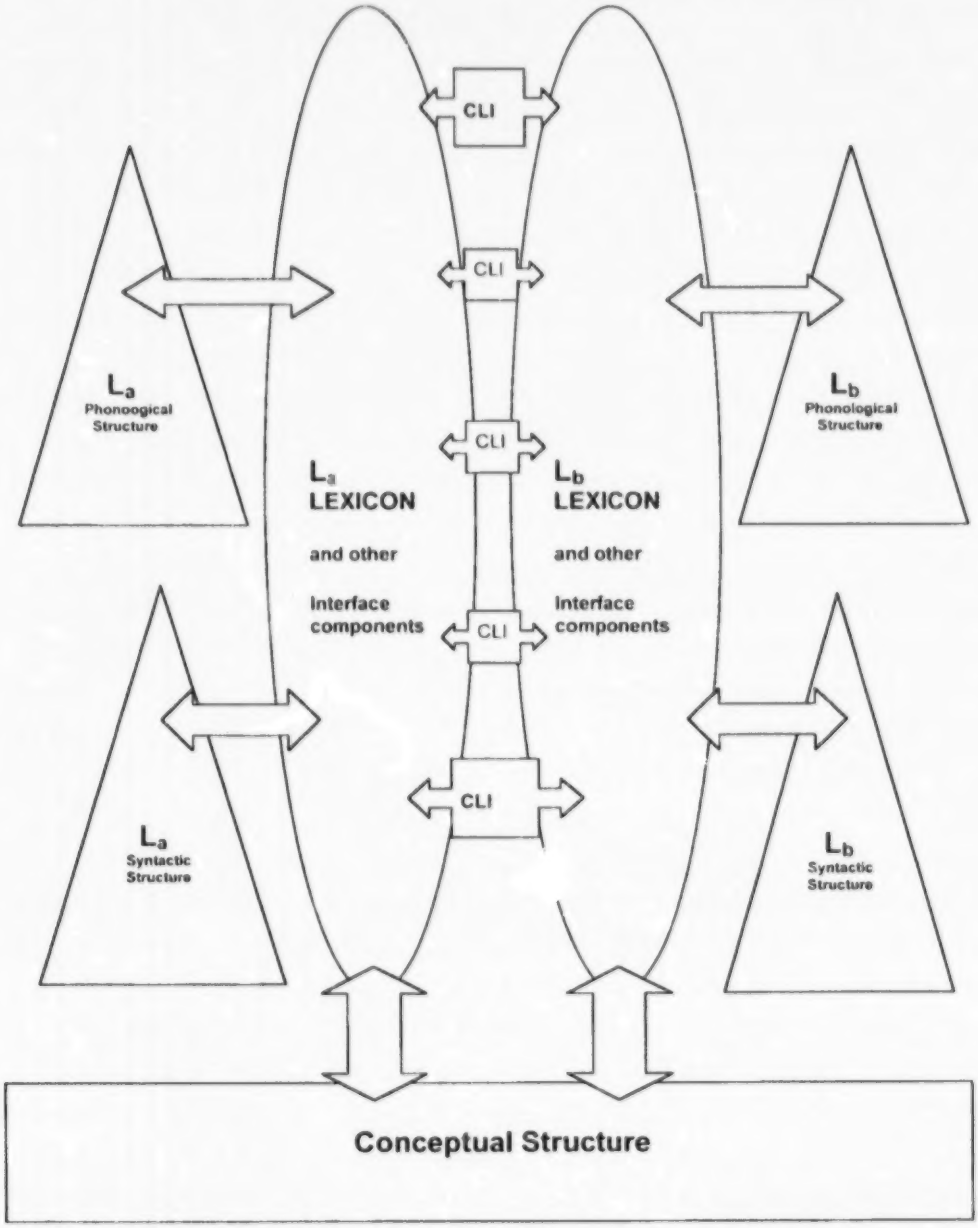
Figure 1: The bilingual tripartite parallel architecture



independently, each with its own specific set of interface components, that part of the lexicon which corresponds to these systems (Smith and Tsimpli's "UG lexicon") would maintain close ties to the linguistic systems of L_a and L_b. Simplifying greatly, the semantic component ("conceptual lexicon") would form a shared representation. A single Conceptual Structure, to which both sets of linguistic modules have access, is proposed following the general idea that CS is an autonomous system with its own combinatorial principles, very different from morphosyntax and phonology. For discussion, see Paradis (1997), De Groot (2002) Kroll & Tokowicz (2001), Jackendoff (1996, 1997). Different types of interface are implied in the model: within the language faculty (L_a and L_b) the Cross Linguistic Interfaces would maintain different kinds of registration and correspondence between L_a and L_b than the kind of interfaces necessary for the integration of the sub-systems and tiers within each language; also, CLI is activated and inhibited in a way that must be different from how intralanguage interfaces are deployed. In turn, both CLI and intralingual interfaces are of a different kind from the interfaces that connect the modules of the language faculty with the Central System conceptual structure. In this way, figure 1 attempts tc depict the two dimensions of modularity that have been discussed in the previous sections: L_a <--> L_b and CS <--> L_{a+b}. Logically, each of the two proposed dimensions of modularity does not necessarily presuppose the other, the second dimension in particular leaving the door open, it would seem, to a prosperous dialogue with approaches to bilingualism outside of the narrow confines of the fields covered in this discussion.

Notes

1. "L1" will indicate first language, and "L2" a second language learned subsequent to the first. L_a and L_b imply that neither language of the bilingual can be determined to be a L2, as in the case of simultaneous bilingual development in early childhood, or when in research, for example, ascertaining which language is L1 or L2 is not possible, or is not pertinent to the object of study. Note, however, that L_a or L_b, as a result of language erosion or fossilization in development may take on the characteristics of a non-native level L2.
2. Very much to the point in the discussion regarding the possible quasi-modular (i.e. penetrable and open to interaction to a degree that non-Central System modules are not) aspects of certain Central System competencies is the result that Christopher did succeed in passing some ToM tasks in which he was able to deploy other general cognitive knowledge sources to compensate for his defective ability in tasks that more directly measured imputation of false belief (Smith & Tsimpli, 1995: 6-7).
3. Meisel (2001), for example, restricts the evaluation of findings to early balanced bilingualism in which neither language exercises a measurable dominance over the other. This, surely, is a good place to begin, regardless of one's view on the relative prevalence of balanced vs. non-balanced early childhood bilingualism. The latter circumstance will present a more exacting test of the differentiation hypothesis (cf. Genesee, 2002).
4. Persistent confusion on the applicability of the notion of semilingualism (for example Toukomaa, 2000), again, flows from the failure to differentiate between the linguistic components (the core grammatical modules) of language proficiency and the broader array of competencies (linguistic and conceptual), higher-order knowledge structures, and processing mechanisms that are called upon in literacy-related, academic-type, performance measures. Thus, for example, it is not coherent to describe deficiencies in bilingual children's performance on literacy-related language assessments (which under normal conditions may indeed show evidence of deficient achievement "in both languages") in terms of semilingualism. On the other hand, application of the concept may refer to deficient or degraded development in the domains of core grammatical competence, but it should be evident that the range of conditions to which the term should apply is quite restricted. Examples may include: genetically transmitted dysfunctions of the Specific Language Impairment (SLI) type, or consequences of extreme input deprivation as in the isolation of deaf children from sign language input during the critical period (by definition abnormal development). Unfortunately research on bilingual SLI is sparse and of uneven quality. For example, in a study by Crutchley et al. (1997) of bilingual SLI, the researchers fail to provide assessment results in subjects' both languages, rendering the data uninterpretable. In contrast, see Håkansson et al. (2003) for guidelines for a more rigorous evaluation of linguistic abilities in bilingual children referred for possible SLI.

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